155449

September 16, 1982

Sauget Report

John Connell, Chief, Illinois/Indiana Field Investigation Section
THROUGH: Gerald Regan, Chief, Central District Office

Edward DiDomenico, Chief
Engineering Unit, Water Quality Branch

Attached is the report on the Sauget survey, consisting of CSI-T's at the following seven facilities:

Sauget POTW
Ethyl Corporation
Clayton Chemical
Trade Waste Incinerator
Roger Cartage
Midwest Rubber
Cerro Copper

The report also contains the results of the groundwater and soil sampling.

The following information is missing from the report because the analytical results are not available at this time:

Organic Analysis:

Sauget POTW - sludge
Clayton Chemical - well sump sediment
Cerro Copper - lagoon sediment

Dioxins:

Sauget POTW - effluent and sludge

This information will be sent to you when it is available. It is not believed that this information will significantly affect the results of the survey.

The Environmental Services Division expended 1.40 work years on this project.

cc: A. H. Manzardo

JConnell/pja 9/16/82
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Sauget Report

William H. Sanders III, Director
Environmental Services Division

Charles H. Sutfin, Director
Water Division

Attached is the report of the Compliance Sampling Inspections - toxic performed by the Central District Office in the Sauget area. This survey was requested by the Permit Section to determine the quantity of toxic pollutants being discharged to the Sauget POTW from selective industries and being discharged by the POTW into the Mississippi River.

The results of the survey indicate that the indirect dischargers which were sampled contribute approximately 15% of the total flow to the treatment plant but only about 3% of the total organic priority pollutant load. The remaining 97% of the organic priority pollutant load is contributed by sources not sampled during the survey. Both the influent and effluent of the treatment showed strong mutagenic responses. However, these responses were caused by sources other than those sampled during the survey.

Because of the importance and the complexity of this survey, the Division spent more resources than for a comparable number of CSI-T's conducted individually. The Environmental Services Division expended 1.40 work years for this survey.

William H. Sanders III, Director

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Sauget Report

William H. Sanders III, Director
Environmental Services Division

Charles H. Sutfin, Director
Water Division

Attached is the report of the Compliance Sampling Inspections - Toxic performed by the Central District Office during November 1982 at the City of Sauget Wastewater Treatment Plant and the Monsanto Krummrich Plant. This survey was requested by the Water Compliance Branch to determine the quantity of toxic pollutants being discharged to the POTW by Monsanto and being discharged by the POTW.

The results of the survey indicate that Monsanto is the probable source of the chlorinated and nitrated organic compounds entering the POTW. Also, concentrations of mercury and nickel in the Treatment plant effluent samples were above the Illinois Effluent Standards.

No total TCDDs or TCDFs were detected in the Monsanto discharge, the treatment plant influent or effluent in the detection range from 0.4 to 1.0 part per trillion. However, higher CDDs and CDFs were detected with concentrations up to of 230 ppt at both the Monsanto discharge and the Treatment plant discharge

William H. Sanders III, Director

Attachment

cc: K. Fenner - 5WO
E. Di Domenico - 5WOC
A. Manzardo - 5WOP

5S CDO J.CONNELL:hjc 6/22/83

6/24/83

CDO 6/24/83

WMCB 6-27-83

6/27

Plant Name:	Sauget Wastewater Treatment Plant Monsanto Chemical Company
Plant Location:	Sauget, Illinois
NPDES PERMIT:	IL0021407
Sampling Dates:	November 9, 16-17, 22-23, 1982
U.S. EPA Inspectors:	John Connell (All three weeks) John McGuire (2nd & 3rd weeks) Ron Lillich (1st week) Charles Steiner (1st week) Steve Wynnchenko (2nd week) Charles Miller (3rd week) Richard Boice (3rd week)
Plant Representatives:	Carl Marciante, Plant Manager

INTRODUCTION

At the request of the Water Compliance Branch, the Central District Office perfomed a series of Compliance Sampling Inspection-toxics at the Sauget, Illinois Wastewater Treatment Plant for three weeks during November 1982. The influent and effluent of the treatment plant were sampled as well as the sampling manhole on Route 3 which represents most of the discharge from the Monsanto Krummrich Plant.

From the flow information collected during the survey, the flow at the Rt. 3 sampling manhole comprised 60 - 66% of the total influent to the treatment plant. Also, approximately 90% of the flow at the Rt. 3 sampling manhole was discharged from the Monsanto Plant.

SAMPLING LOCATION:

The effluent samples for all three weeks were collected at the plant effluent just as the wastewater entered the sewer discharging to the river. The influent sample for the first week was taken upstream of the oil skimmer prior to the trash racks. For the second and third weeks, the influent samples were collected after the oil skimmers and prior to the grit chambers-neutralizer bays, see Figure 1. The sampling location had to be changed because of the use of automatic samplers. Since the surface of the wastewater in the influent pit is approximately 25 feet below ground level, the ISCO samplers could not draw samples if the samplers were placed at ground level. In addition, the samplers could not have been placed on the catwalk at a lower level in the influent pit since the samplers are not explosion proof. However, the sampling location chosen is representative of the wastewater entering the treatment plant.

The Monsanto Rt. 3 sampling manhole is shown in Figure 2. This is the sampling point used by the treatment plant to monitor Monsanto's discharge. Mr. Marciante stated that most of Monsanto's discharge is through the Rt. 3 sewer. As seen in Figure 3, there is no discharge from the Monsanto plant into the sewer just north of the plant. However, from a sewer map of the Monsanto plant there appears to be some surface runoff into the north sewer. Also, there may be some process discharge from the northwest part of the plant into the north sewer. According to the sewer map of the Monsanto plant, most of the wastewater flows south and is discharged into the Rt. 3 sewer which was sampled.

Monsanto is not the sole discharger into the Rt. 3 sewer. As seen in Figure 2, the wastewater from the following dischargers enters the sewer prior to the Monsanto discharge point: The east side of Cerro Copper, Sterling Steel (which was not operating at the time of the sampling) and the Village of Sauget (residential area). Mr. Marciante stated that the discharge from Roger Cartage is included with the discharge from the Village of Sauget.

SAMPLING METHOD:

Two different sampling methods were used during the survey. One method was a composite of a series of grab samples, the other method was a 24 hour composite sample using ISCO samplers (Model 1680).

A composite of grab samplers were taken at the Monsanto Rt. 3 sampling manhole during each of the three weeks. ISCO samples could not be used at this location because the surface of the wastewater is approximately 20 ft. below ground level and the wastewater flow was in excess of 3000 gpm. Also, grab samples were composited at the influent and effluent of the treatment plant during the first week. This sampling method consisted of collecting a sample in a 10,000 ml glass jar which was rinsed with wastewater just prior to each sample collection. An aliquot of the sample was then poured into two 10,000 ml glass jars (storage jars) with telfon lined caps. The storage jar was cleaned with methylene chloride prior to use. At the end of the compositing period, each storage jar was shaken and the sample water poured into the various sample bottles. Duplicate samples were collected in the same manner for the treatment plant. ISCO samplers with 10,000 ml glass jars were used to collect 24 hour time composite samples, with the sampler drawing approximately 200 ml of water every 30 minutes. These were taken at the plant influent and effluent during the second and third week of the survey. The 10,000 ml glass jars were cleaned with methylene chloride prior to use. Four ISCO samplers were used at the plant effluent during both the second and third week. Four samplers were also used on the influent during the third week, two samplers for USEPA and two samplers for the plant. Only three samplers were used for the plant influent during the second week. As a result, after all the sample bottles were filled for these EPA samples, there was only sufficient sample water remaining for the plant to fill two amber gallon bottles.

A single oil and grease sample was collected at each sampling location each week. The oil and grease samples were collected in a quart glass bottle. Duplicate samples were collected for the plant.

All sample preservation, sample handling and bottle cleaning procedures were in accordance with the Central District Office Field Procedure manual. Chain-of-custody was maintained on the samples and transferred to the Central Regional Laboratory. The treatment plant supplied their own sample bottles, except for the oil and grease bottles. CDO personnel preserved the plant's samples.

FLOW MEASUREMENT

The wastewater influent flow to the treatment plant was obtained from a recorder chart in the control room for the first week's sampling and from the totalizer for the second and third week of sampling. For the last two weeks of the survey, the flow was obtained for both the period of the 24 hour composite sampling and the period of the sampling at the Rt. 3 manhole.

The flow at the Rt. 3 sampling manhole covering the sampling period was obtained from a totalizer at the manhole. Also, an instantaneous flow measurement was obtained from flow instrumentation at the manhole each time a grab sample was collected. In addition, the flow from the Village of Sauget (including Sterling Steel and Roger Cartage) and Cerro Copper "east" were obtained. The discharge from the Monsanto plant can be determined by difference between the flow at the Rt. 3 sampling manhole and the flow from the Village of Sauget and Cerro Copper "east". The flow meter measuring the flow from the

Village of Sauget was not operating; however, the plant estimated a flow of 100,000 GPD. The totalizer flow readings for the Cerro Copper "east" discharge is taken by treatment plant personnel only once a day, at approximately 9:00 a.m. These 24 hour readings are only estimates of the flow during the time of sampling at the Rt. 3 manhole.

PLANT OPERATIONS

During the first week of sampling, the grit chamber was plugged and not operating; also, the south clarifier was out of service at the start of the day but was started being filled at 1:00 p.m. During the sampling for the second and third week, all of the plant processes were operating.

SAMPLING LOG

First Week (November 9, 1982)

Effluent Sample (83CC01S02)

Time	Aliquot (ml)
11:35 a.m.	3000
1:30 p.m.	3000
3:35 p.m.	3000

The oil and grease sample was collected at 3:50 p.m.

Influent Sample (83CC01S01)

Time	Aliquot (ml)
12:10 p.m.	3000
1:50 p.m.	3000
4:00 p.m.	3000

The oil and grease sample was collected at 4:15 p.m.

RT. 3 Sample (83CC01S03)

Time	Organic Dioxins Aliquot (ml)	Other Parameters	Flow (gal/min) Instantaneous
2:25 p.m.	4000	2850	3279
4:25 p.m.	4000	2850	3422

The oil and grease sample was collected at 4:50 p.m. The aliquot collected at 2:45 p.m. was light tan in color, that collected at 4:25 p.m. was gray in color and the aliquot collected for the plant at 4:25 p.m. was a brown color.

Reagent Blank (83CC01R01)

Flow (gal/min) from 2:10 p.m. - 4:25 p.m:

Treatment plant	5700
Rt. 3	3525
Village of Sauget *	69
Cerro Copper "east" *	249
Monsanto	3207

* based on 24 hour flow

Second Week (November 16-17, 1982)

Effluent Samples (83CC02S02)

Four ISCO samples ran from 11:50 a.m. on November 16 to 10:50 a.m. on November 17, 1982. The oil and grease sample was collected at 10:50 a.m. on November 17. 1982. The pH of the composite sample was 6.9.

Influent Samples (83CC02S01)

Three ISCO samples ran from 11:25 a.m. on November 16 to 10:25 a.m. on November 17, 1982. The oil and grease sample was collected at 9:25 a.m. on November 17. 1982. The pH of the composite sample was 3.3.

The plant flow during the 24 hour sampling period was 7.81 MG.

Rt. 3 Samples (November 16, 1982) (83CC02S03)

Time	Aliquot (ml)	Flow (gal/min) Instantaneous
12:45 p.m.	2000	3564
1:40 p.m.	2000	3849
2:40 p.m.	2000	3707
3:40 p.m.	2000	3493
4:40 p.m.	1500	3350

Only 1500 ml were added to the storage jug for the fifth sample because this filled the jug. The oil and grease sample was collected at 2:50 p.m.

Reagent Blank (83CC02R04)

Flow (gal/min) during sampling at Rt. 3:

Plant Effluent 12:04 p.m. - 4:00 p.m.	5424
Rt. 3 12:55 p.m. - 4:47 p.m.	3565
Village of Sauget *	69
Cerro Copper "east" *	344
Monsanto	3152

* based on 24 hour flow

Third Week (November 22 - 23, 1983)

Effluent Samples (83CC03S01)

Four ISCO samples ran from 9:10 a.m. on November 22, 1982 to 8:10 a.m. on November 23, 1982. The oil and grease sample was collected at 8:35 a.m. on November 23, 1982.

Influent Samples (83CC03S02)

Four ISCO samples ran from 10:50 a.m. on November 23, 1982 to 9:50 a.m. on November 23, 1982. The oil and grease sample was collected at 9:13 a.m. on November 23, 1982.

The plant influent flow during the 24 hour sampling period was 8.94 MG. For the sampling on November 22-23, 1982 the sample bottles were labeled incorrectly. The correct influent sample number is 83CC03S02 and the correct effluent number is 83CC03S01. This error was not discovered until the samples were analyzed. Two methods were used to verify the error. First, in reviewing the data it was noticed that S02 had higher metal concentration than S01. Second, the sample bottles were inspected. The S02 sample bottles appeared similar to the influent sample bottles for the first two weeks, and the S01 sample bottles appeared similar to the effluent sample bottles for the first two weeks.

Rt. 3 Sample (November 22, 1982) (83CC03S03)

Time	Aliquot (ml)	Flow (gal/min) Instantaneous
11:20 a.m.	1500	4135
12:20 p.m.	1500	3707
1:20 p.m.	1500	3921
2:20 p.m.	1500	3636
3:20 p.m.	1500	3849
4:20 p.m.	1500	3707

The oil and grease sample was collected at 3:53 p.m.

Reagent Blank (83CC03R04)

Flow (gal/min) during sampling at Rt. 3:

Plant Effluent 9:16 a.m.-4:44 p.m.	5699
Rt. 3 11:33 a.m. - 4:28 p.m.	3692
Village of Sauget *	69
Cerro Copper "east" *	440
Monsanto	3183

* based 24 hour flow

COMPOSITE SAMPLES

The following composite samples were prepared by the Region V Central Regional Laboratory for the dioxin/furan analyses:

Dioxin/Furan Analysis Samples	1260 ml alequots combined from sample #	Source	Date
83CC04S01	83CC01S01	influent	11/9/82
	83CC02S01	influent	11/16-17/82
	83CC03S01	effluent	11/22-23/82
83CC04S02	83CC01S02	effluent	11/9/82
	83CC02S02	effluent	11/16-17/82
	83CC03S02	influent	11/22-23/82
83CC04S03	83CC01S03	Route 3	11/9/83
	83CC02S03	Route 3	11/16-17/82
	83CC03S03	Route 3	11/22-23/83

As can be seen, sample 83CC04S03 was a composite of the samples collected from the Route 3 manhole. 83CC04S01 and 83CC04S02 were supposed to be composites of influent and effluent samples, respectively. However, the influent and effluent sample numbers were mixed up for the samples collected on 11/22-23/82.

NPDES

The Sauget WWTP was rated marginal for flow measurement and unsatisfactory for laboratory practices. The flow measurement equipment needed adjustment for zero flow and the plant had scheduled this repair for late November, 1982. The laboratory does not follow Standard Methods for preparation and analysis of BOD. The plant freezes the Friday through Wednesday samples and then prepares and starts the 5 day test for all seven samples on Thursday.

ANALYTICAL RESULTS

Analytical results are tabulated in Attachments 1, 2, 3 and 4. In addition, the laboratory data sheets are attached.

All analyses were completed by the USEPA Region V Central Regional Laboratory (CRL) except for the dioxin/furan which was performed by Wright State University. The CRL noted that some of the samples were so toxic that the BOD values could not be measured. Also note that the concentrations of the tentatively identified organic compounds are very rough approximations.

Attachment 3 shows that the concentrations of mercury in the effluent samples for all three weeks are above the Illinois Effluent Standard. In addition, the concentration of nickle in sample 82CC01S02 (the first week) is above the Illinois Effluent Standard.

In Attachment 5, the percent removal of metals by the Sauget POTW is tabulated. Most of the percent removals are comparable to those calculated from the results for samples collected on March 2-3, 1982.

In Attachments 6, 7 and 8, pollutant loadings and percent loadings are tabulated. The results show that the flow from the Route 3 manhole can contribute a large portion of the Sauget POTW pollutant load for the following significant parameters:

suspended solids

phenolics

2 - chlorophenol

2, 4 - dichlorophenol

2 - nitrophenol

4 - nitrophenol

hexachloroethane

1, 2 - dichlorobenzene

1, 3 - dichlorobenzene

1, 4 - dichlorobenzene

nickle

Monsanto is the probable source of the chlorinated and nitrated organics. The loadings and percentages calculated provide only a qualitative comparison because the sampling time periods do not coincide. For example, the Route 3 manhole samples collected on November 16 and November 22, 1982, were five and six hours composite samples, respectively, while the samples from the influent and effluent of the Sauget POTW were twenty-four hour composites.

Not unexpectedly, the pollutant loadings calculated from the sampling during November 1982 is considerably different from the loadings calculated from the March 2-3, 1982 sampling. Parameters that had a very high load on March 2-3, 1982, but much lower loads during the November 1982 sampling are 4-nitrophenol and bis (2 chloroethyl) ether.

The dioxin/furan results are summarized and presented in Attachment 9. As noted in the cover letter from Dr. Fierman, no total TCDDs or TCDFs were detected in the analyses although higher CDDs and CDFs were detected. The following table presents calculated kilogram loadings per day using the average flows. This table appears to show that most of the CDD and CDF loading to the Sauget POTW comes from the flow through the Route 3 manhole.

TABLE OF KILOGRAM LOADINGS IN KG/DAY

Sample	Location	PCDF	HxCDF	HpCDD	OCDD	OCDF
83CC04S01	POTW Influent	.0006	.0002	.0011	.0071	.0003
83CC04S02	POTW Effluent	ND	ND	.00003	.0015	ND
83CC04S03	Rt. 3 MNHOLE	.0003	.0001	.0009	.0045	.0002

The mix-up in labeling the sample bottles for the third week is probably the reason dioxins were detected in the effluent sample.